

double lock chambers for connecting said loader and said vacuum loader,

wherein said conveying structure is provided with an arm extendable into said double lock chambers and said plural vacuum processing chambers, and said conveying structure conveys substrates, with a surface thereof to be treated being oriented horizontally, from either of the double lock chambers to said convey chamber and then to any of said plural vacuum processing chambers one by one,

A wherein each of said plural vacuum processing chambers has a substrate table to maintain a substrate surface to be treated to be oriented horizontally during a vacuum processing, so that substrate surfaces treated in said plural vacuum processing chambers are oriented horizontally,

wherein said loader includes cassette tables disposed adjacent to and in parallel with each other located outside of said double lock chambers,

wherein each of said cassette tables is disposed substantially horizontally, and

wherein said substrates are conveyed between cassettes on the cassette table and said plural vacuum chambers by said conveying device and conveying structure.

2 13. A conveyor system for use in a vacuum processing apparatus, comprising:

a cassette mount unit having cassettes for receiving plural substrates to be processed, the substrates being received with a surface to be treated being oriented

horizontally;

a conveyor loader having a first conveying structure for conveying substrates to be processed;

a vacuum loader provided with a convey chamber, plural vacuum processing chambers and a second conveying structure installed in said convey chamber, for conveying said substrates to be processed; and

double lock chambers for connecting said conveyor loader and said vacuum loader, disposed separately and adjacently each other,

wherein said second conveying structure is provided with an arm extendable into said double lock chambers and said plural vacuum processing chambers,

wherein each of said plural vacuum processing chambers has a substrate table to maintain a substrate surface to be treated, oriented horizontally during a vacuum processing, such that the substrates are treated in said plural vacuum processing chambers with the surfaces of the substrates to be treated being oriented horizontally,

wherein said substrates are conveyed between cassettes and plural vacuum processing chambers by the two conveying structures.

3 14. A conveyor system for use in a vacuum processing apparatus according to claim ² 13, wherein said double lock chambers are a load lock chamber for receiving said substrates to be processed from said first conveying structure and an unload lock chamber for delivering substrates which have been

processed, to said first conveying structure.

4 16. A conveyor system for use in a vacuum processing apparatus according to claim ²14, wherein said conveyor loader is an atmospheric conveyor loader.

5 16. A conveyor system for a vacuum processing apparatus in which a substrate to be processed is processed one by one in plural vacuum processing chambers, comprising:

a receiving structure for receiving said substrate to be processed,

a 2 a first conveying structure for conveying said substrate to be processed;

a vacuum loader provided with a convey chamber, plural vacuum processing chambers and a second conveying structure installed in said convey chamber, for conveying said substrate to be processed; and

double lock chambers for connecting said first conveying structure and said vacuum loader, disposed separately and adjacently each other,

wherein the second conveying structure conveys said substrate to be processed between said double lock chambers and said vacuum processing chambers in a vacuum,

wherein the second conveying structure is provided with an arm extendable into the double lock chambers and the plural vacuum processing chambers, and said second conveying structure has a sole device conveying said substrate from either double lock chamber to said convey chamber and then to

any of the plural vacuum processing chambers one by one, with the substrate disposed such that a surface thereof to be treated is oriented horizontally, and opening portions are provided for connecting said vacuum processing chambers to said convey chamber,

wherein each of said plural vacuum processing chambers has a substrate table to maintain a substrate surface, to be treated, oriented horizontally during a vacuum processing, such that the substrates are treated in said plural vacuum processing chambers with surfaces of the substrates to be treated being oriented horizontally, and

wherein said substrate is conveyed between the receiving structure and said plural vacuum processing chambers by the two conveying structures.

17. A conveyor system for use in a vacuum processing apparatus, comprising:

a transfer conveyor arranged so as to access plural cassettes keeping wafer surfaces to be treated oriented horizontally, and plural lock chambers, said plural lock chambers having gate valves directed toward said transfer conveyor, for connecting said transfer conveyor and a vacuum loader, said plural lock chambers being disposed separately and adjacently each other;

a cassette table holding said cassettes, arranged to direct a wafer takeout port of said plural cassettes toward a side of said transfer conveyor;

a transfer chamber having plural gate valves which

are disposed to enable plural processing chambers to be connected at a surrounding portion with said plural lock chambers; and

a vacuum transfer conveyor provided in said transfer chamber for conveying said wafers, with surfaces to be treated oriented horizontally, from either of the double lock chambers to said transfer chamber and then any of the plural vacuum processing chambers one by one,

wherein each of said plural vacuum processing chambers has a substrate table to maintain a substrate such that a surface thereof to be treated is oriented horizontally during a vacuum processing, so that the substrates are treated in said plural vacuum processing chambers with surfaces of the substrates to be treated being oriented horizontally, and

wherein said substrate is conveyed between the cassettes and said plural vacuum processing chambers by said transfer conveyor and said vacuum transfer conveyor.

113. A conveyor system for use in a vacuum processing apparatus, comprising:

a transfer conveyor structure arranged so as to access plural cassettes and plural lock chambers, traveling on a track provided in a conveyor structure in a front row of said plural lock chambers, said plural lock chambers having gate valves directed toward said transfer conveyor structure, for connecting said transfer conveyor structure and a vacuum loader, disposed in front of said vacuum loader;

a cassette table arranged to direct a wafer takeout

port of said plural cassettes toward a side of said transfer conveyor structure;

a transfer chamber having plural gate valves which are disposed to enable plural processing chambers to be connected at a surrounding portion with said plural lock chambers; and

a vacuum transfer conveyor structure provided in said transfer chamber for conveying said substrate, with a surface thereof to be treated being oriented horizontally, from any of said plural lock chambers to said transfer chamber and then any of said plural vacuum processing chambers one by one,

wherein each of said plural vacuum processing chambers has a substrate table to maintain a substrate such that the surface thereof to be treated is oriented horizontally during a vacuum processing, so that the substrates are treated in said plural vacuum processing chambers with surfaces of the substrates to be treated being oriented horizontally, and

wherein said substrate is conveyed between the cassettes and said plural vacuum processing chambers by said transfer conveyor structure and vacuum transfer conveyor structure.

19. A conveyor system for use in a vacuum processing apparatus, comprising:

a first loader,

a second loader provided with a convey chamber,

conveying structure and plural vacuum processing chambers; and
lock chambers for connecting said first loader and
said second loader, wherein:

each of said plural vacuum processing chambers has a
substrate table to maintain a substrate such that a surface
thereof to be treated is oriented horizontally during a vacuum
processing, so that the substrates are treated in said plural
vacuum processing chambers with surfaces of the substrates to
be treated being oriented horizontally,

said first loader includes cassette tables disposed
adjacent to and in parallel with each other located outside of
said lock chambers,

each of said cassette tables is disposed
substantially horizontally,

said conveying structure is located in said convey
chamber to transfer each substrate between one of said lock
chambers and one of said plural vacuum processing chambers,
such that said substrate is placed on and removed from said
substrate table with a surface thereof to be treated being
oriented horizontally,

said lock chambers are so disposed as to face to
said cassette tables, such that another conveying structure is
disposed between said cassette tables and said lock chambers,
and

said substrate is conveyed between cassettes and
said plural vacuum processing chambers by said conveying
structure and said another conveying structure.

20. A base frame for vacuum processing, comprising:
a support, for a cassette for storing a plurality of wafers which are to be stored in front of a vacuum loader, such that surfaces thereof to be treated are oriented horizontally;

double wafer locking structures for holding the wafers in a gas atmosphere during a first time period and in a vacuum during a second time period, disposed separately and adjacently each other, the locking structures holding the wafers with surfaces thereof to be treated being oriented horizontally,

evacuating structure for evacuating said double wafer locking structures;

gas introduction structure for introducing a gas into said double wafer locking structures;

a first transfer structure for transferring the wafer between said support for a cassette and said double wafer locking structures, disposed in a front row of the double wafer locking structures, the first transfer structure transferring the wafer such that a surface thereof to be treated is oriented horizontally;

a plurality of vacuum processing chambers for one by one treating said wafers which are to be processed in a vacuum, such that surfaces of the wafers to be treated are oriented horizontally during the treating; and

a second transfer structure for transferring said wafers, with surfaces thereof to be treated or having been treated being oriented horizontally, between said double wafer

locking structures and at least one of the plurality of vacuum processing chambers, for conveying said wafer to be processed and which has been processed, one by one.

10 21. A base frame for a vacuum processing apparatus, comprising:

double wafer locking structures for holding wafers in a gas atmosphere during a first time period and in vacuum during a second time period;

Q a first transfer structure for transferring said wafers, with surfaces thereof to be processed being oriented horizontally, between a cassette support which supports a cassette holding said wafers and said double wafer loading structures while said double wafer locking structures are under a gas atmosphere; and

a second transfer structure conveying said wafers to be processed and which have been processed, with surfaces thereof to be processed and which have been processed being oriented horizontally, for transferring said wafers between said double wafer locking structures and plural vacuum processing chambers one by one,

wherein said second transfer structure is provided with an arm extendable into said double lock chambers and said plural vacuum processing chambers, and said second transfer structure conveys wafers, with surfaces thereof to be processed or which have been processed being oriented horizontally, from either double wafer locking structure to said plural vacuum processing chambers one by one,

wherein said cassette support includes cassette tables disposed adjacent to and in parallel with each other located outside of said lock chambers, and

wherein said wafers are conveyed between cassettes supported by the cassette support and said plural vacuum chambers by said two transfer structures, and

wherein the wafers are treated in said plural vacuum processing chambers with surfaces thereof which are treated being oriented horizontally.

11/22. A base frame for a vacuum processing apparatus, comprising:

Q a support, for a cassette for storing a plurality of wafers which are to be stored with surfaces thereof which are treated being oriented horizontally;

another support, for at least one cassette for storing a plurality of dummy wafers which are to be stored horizontally;

double wafer locking chambers disposed separately and adjacently each other;

a first conveying structure for transferring said wafers between said support for cassettes and said double wafer locking chambers;

a second conveying structure disposed in a convey chamber of a vacuum loader, conveying said wafers to be processed and which have been processed, for transferring said wafers between said double wafer locking chambers and plural vacuum processing chambers of said vacuum loader one by one,

Q wherein said second conveying structure is provided with an arm extendable into said double wafer locking chambers and said plural vacuum processing chambers, and said wafers are treated in said plural vacuum processing chambers with surfaces thereof which are treated being oriented horizontally.--

for example.

According to the present invention, the lock chamber inlet and outlet are at a same level, so that the, e.g., wafer can pass therethrough horizontally, simplifying the transfer.

In addition, according to the present invention, the transfer arm in the vacuum transfer chamber can enter both the lock chambers and each processing chamber, to simplify transfer in the vacuum, and such arm can hold the, e.g., wafer with the surface to be processed, or having been processed, held horizontally.

During the Interview, the undersigned also discussed specific prior art documents, as listed in the following:

- (1) U.S. Patent No. 4,923,584 to Bramhall et al., representing structure of Eaton Corporation;
- (2) U.S. Patent No. 4,715,764 to Hutchinson, representing structure of Varian Associates, Inc.; and
- (3) Japanese Patent Document No. 63-153270, particularly the structure therein shown in Fig. 1 thereof, representing structure of ULVAC Corp.

During this Interview, differences between the structure and apparatus according to the present invention and that according to the above-listed prior art documents were also discussed, particularly in light of the aforementioned advantages achieved according to the present invention.

During the aforementioned Interview, it was also indicated to the Examiner that a Preliminary Amendment would be submitted in the above-identified application. Moreover, noting particularly the filing date of the original patent

application the benefit of which is being claimed under 35 USC §120 in the above-identified application, and a desire for earliest issuance of a U.S. patent based upon the above-identified application particularly in view thereof, the Examiner was encouraged to contact the undersigned if any issues remained after examination of the above-identified application, so as to speedily achieve allowance of claims in the above-identified application and achieve earliest possible issuance of a U.S. patent based thereon.

Subsequent to the aforementioned interview, Applicants have amended their claims, prior to examination of the above-identified application, in order to cancel original claims 1-11 (all of the original claims in the application) without prejudice or disclaimer, and to add claims 12-22 to the application. Of these newly added claims, claims 12, 13 and 16-22 are independent claims. Claims 12-19 are directed to a conveyor system for use in a vacuum processing apparatus, and claims 20-22 are directed to a base frame for vacuum processing apparatus.

Entry of the present amendments, and, subsequently, examination of the above-identified application in due course, are respectfully requested.

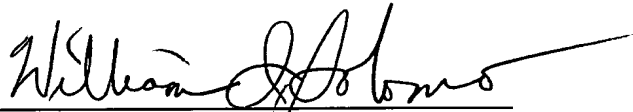
Applicants are submitting concurrently herewith an Information Disclosure Statement in connection with the above-identified application, submitting an additional document for consideration by the Examiner in connection with the above-identified application. In examination of the above-identified application, it is respectfully requested that this

newly cited and submitted document be considered.

To the extent necessary, Applicants petition for an extension of time under 37 CFR § 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Deposit Account No. 01-2135 (Case No. 503.30414V20) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



William I. Solomon
Registration No. 28,565

1300 North Seventeenth Street
Suite 1800
Arlington, VA 22209
Tel.: 703-312-6600
Fax.: 703-312-6666

WIS:alw